

## **REMARKS**

Claims 1, 4-8, 11-14, 29, and 31-40, all the claims pending in the application, stand rejected on prior art grounds. Applicants respectfully traverse these rejections based on the following discussion.

### **I. The Prior Art Rejections**

Claims 1, 4-8, 11-14, 29, and 31-40 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Miyazaki (U.S. Publication No. 2002/0171152), in view of Capote, et al. (U.S. Publication No. 2005/0218517), hereinafter referred to as Capote. Applicants respectfully traverse these rejections based on the following discussion.

The claimed invention provides an integrated circuit structure having solder connectors that are surrounded by compressible material. The compressible material is surrounded by insulating material. In the rejection, the Office Action argues that Capote and Miyazaki disclose many features of the claimed invention. However, the prior art of record does not disclose compressible material surrounding solder connectors AND an insulating material surrounding the compressible material. Moreover, the prior art does not teach or suggest a compressible film between solder connectors and an insulating material. Instead, the layers 42 and 17 of Capote and Miyazaki (which the Office Action asserts teaches the “compressible film” of the claimed invention), respectively, are between a solder bump and another solder bump. Therefore, as explained in greater detail below, Applicants respectfully submit that the prior art of record does not teach or suggest the claimed invention.

Applicants' traverse the rejections because the prior art of record does not disclose compressible material surrounding solder connectors AND an insulating material surrounding the compressible material. Specifically, the "reworkability layer 42" of Capote (which the Office Action asserts teaches "compressible film" of the claimed invention) does not *surround* sides of the "solder bumps 14" (which Office Action asserts teaches the "solder connectors" of the claimed invention). Instead, the reworkability layer 42 is merely adjacent to the solder bumps 14.

Applicants submit that to interpret the claimed language "surround" to merely mean "next to" or "adjacent" would ignore the English definition of the term "surround", thereby rendering the claimed language virtually meaningless. The reworkability layer 42 is not adjacent upper and lower portions of solder bumps 14. Therefore, it would be inaccurate to conclude that the reworkability layer 42 "surrounds" solder bumps 14.

Furthermore, Capote does not teach that the layers 38/40 are *insulators*. Instead, as discussed in paragraph 0147 of Capote, the layers 38 and 40 are attachment and stress distribution layers. Layer 42 is the reworkability layer. Layers 38 and 40 are generally stiffer than layer 42. Layers 38 and 40 are generally polymers or polymers filled with inorganic materials so as to have a high modulus and a low coefficient of thermal expansion such as polyimide. Layer 42 is generally a meltable polymer such as a thermoplastic, for example a polyimide-siloxane co-polymer. The layers can be comprised of coated tape, such as SumiOxy.RTM. ITA-5120 or ITA-5315 available from Oxychem, Grand Island, N.Y. A flux adhesive 34 as described previously is applied between the chip/encapsulant/solder bump combination and the substrate. The solder is reflowed and the flux adhesive 34 is hardened. Rework is made possible by the layer 42.

The layer 42 and solder bumps 14 are remelted and the chip 10 is pulled away from the substrate 20 (FIG. 20). The flux adhesive 34 firmly retains the layer 40 and part of the solder bumps 14 on the substrate 20 while the chip bonding layer 38 firmly retains the other part of the solder bumps 14 on the chip 10 as the reworkable layer 42 separates without damage to the chip 10 or the substrate 20.

Accordingly, Applicants submit that the prior art of record does not disclose compressible material surrounding solder connectors AND an insulating material surrounding the compressible material. Instead, the reworkability layer 42 of Capote is merely adjacent to the solder bumps 14; it is not adjacent upper and lower portions of solder bumps 14. Moreover, Capote does not teach that the layers 38/40 are *insulators*. Therefore, it is Applicants' position that the prior art of record fails to teach or suggest the claimed features of "a compressible film ... surrounding sides of said solder connectors ... and an insulating material surrounding said compressible film" as defined by independent claims 1 and 29; and, "a compressible film surrounding sides of said lead-free connectors ... and an insulating underfill surrounding said compressible film" as defined by independent claim 8.

In addition, Applicants traverse the rejections because the prior art of record fails to teach or suggest the claimed feature of a compressible film between solder connectors and an insulating material.

Such features are defined in independent claims 1 and 29 using the following language: "wherein said compressible film is between said solder connectors and said insulating material"; and, in independent claim 8 using the following language: "wherein said compressible film is between said lead-free connectors and said insulating underfill".

Moreover, as illustrated in FIG. 6 of Applicants' disclosure, the compressible film 20 is between the solder connectors 12 and the insulating material 62.

To the contrary, referring to FIG. 18 of Capote, the reworkability layer 42 (which the Office Action asserts teaches the "compressible film" of the claimed invention) is not between the solder bumps 14 (which the Office Action asserts teaches the "solder connectors" of the claimed invention) and an insulator. Instead, the reworkability layer 42 is between a solder bump 14 and another solder bump 14.

Furthermore, the insulating resin layer 17 (which the Office Action asserts teaches the "compressible film" of the claimed invention) is not between the solder bumps 14 (which the Office Action asserts teaches the "solder connectors" of the claimed invention) and an insulator. Instead, the insulating resin layer 17 is between a solder bump 14 and another solder bump 14. The insulating resin layer 17 is also between a solder bump 14 and a metal post 15; however, the metal posts 15 are not insulative.

Accordingly, Applicants submit that neither Capote nor Miyazaki, neither individually nor in combination, teach or suggest a compressible film between solder connectors and an insulating material. Instead, the layers 42 and 17 of Capote and Miyazaki (which the Office Action asserts teaches the "compressible film" of the claimed invention), respectively, are between a solder bump and another solder bump. Thus, it is Applicants' position that the prior art of record fails to teach or suggest the claimed features "wherein said compressible film is between said solder connectors and said insulating material" as defined by independent claims 1 and 29; and, "wherein said compressible film is between said lead-free connectors and said insulating underfill" as defined by independent claim 8.

Therefore, it is Applicants' position that the proposed combination of Capote and Miyazaki does not teach or suggest many features defined by independent claims 1, 8, 29 and that such claims are patentable over the prior art of record. Further, it is Applicants' position that dependent claims 4-7, 11-14, 28, and 31-40 are similarly patentable, not only because of their dependency from a patentable independent claims, but also because of the additional features of the invention they defined. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections.

## **II. Formal Matters and Conclusion**

In view of the foregoing, Applicants submit that claims 1, 4-8, 11-14, 29, and 31-40, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary. Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 09-0458.

Respectfully submitted,

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